Application No.: 09/601,515 Docket No.: 20162-00564-US

AMENDMENTS TO THE SPECIFICATION

Please replace paragraph 1 on page 3 with the following:

a1

Again in this prior art, the low pass filter having a cut-off frequency on the order of 100Hz is used, and thus there remains the problem of time misalignment between bass components and higher pitch components in the similar manner as occurs with the technique shown in Fig. 1. Furthermore, if a [base] bass tone containing a component having a fundamental frequency of 110Hz is concurrently input with a bass drum tone containing a component having a fundamental frequency of 100Hz, the nonlinear circuit 17 would produce components representing both sum and difference between the both input signals, or 10Hz component and 210Hz component, resulting in boosting unwanted bass tones and producing sounds which are unmusical and grating.

Please replace paragraph 2 on page 6 with the following:

a2

It is another object of the invention to provide an apparatus and a method for acoustic effect which is capable of producing overtones of fundamental tones of bass musical instruments such as a [base] bass, a bass drum and the like and boosting bass tones while maintaining a time concurrency between bass components and alto and/or higher pitch components without producing components which are not originally present in the musical tone signal to cause acoustic abnormalities in the auditory sensation.

Please replace paragraph 3 on page 6 with the following:

a3

It is to be understood that what is generically referred to herein as a bass musical instrument is one which produces a fundamental tone equal to or below 200Hz. Accordingly, while it is possible to produce a fundamental tone of 300Hz with the [base] bass, the latter is not included in the bass musical instrument when it is used to produce a fundamental tone of such a higher pitch.

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Please replace paragraph 4 on pages 6-7 with the following:

a4

In one form of the invention, components corresponding to double or higher overtones of a bass musical instrument such as a [base] bass, a bass drum or the like are picked out from an input audio signal by filter means, and distortion applying means applies a non-linear distortion which is unsymmetrical with respect to the center of an amplitude to the components which correspond to double or higher overtones.

Please replace paragraph 1 on page 7 with the following:

a5

In another form of the invention, components corresponding to double overtone regions of a bass musical instrument such as a [base] bass or a bass drum are picked out from an input audio signal by filter means, and distortion applying means applies a non-linear distortion to the double overtone region components which are picked out.

Please replace paragraph 2 on page 9 with the following:

a6

Filter means 31 picks out the signals corresponding to double or higher overtones of a bass musical instrument such as a [base] bass or a bass drum from the input audio signal from the input terminal 11. In the present instance, the filter means 31 only comprises a high pass filter (HPF) 32. The high pass filter 32 has a cut-off frequency Fch which depends on the variety of a musical instrument, for which the bass tones are to be boosted, and which lie in a range of 50 ~ 300Hz, but which may be on the order of 200Hz so as to be generally applicable to any bass musical instrument. The high pass filter 32 has a cut-off response which is chosen so that components corresponding to fundamental tones of the bass musical instrument are reduced in their levels, but can not be completely cut off so as to be delivered from the high pass filter 32. The cut-off response may be preferably on the order of 12dB/OCT, for example. Specifically, assuming that a bass tone to be boosted has fundamental tone of 100Hz while the high pass filter 32 has a cut-off frequency of 200Hz, the fundamental component of 100Hz appears in the output signal from the high pass filter 32 with a level reduction by a factor of 4.

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Please replace paragraph 1 on pages 12-13 with the following:

The audio signal delivered from the output terminal 15 has an abundance of overtones and thus includes an apparent boosting of bass tones. Specifically, a musical tone signal which is produced as the musical instrument is attacked on and which has a higher level for overtones will be subject to the saturation region of the S-shaped response (Fig. 6) of the distortion applying means 34, whereby they are strongly compressed to produce more overtones, thus boosting a beat sensation and an impact sensation. If the level is slightly reduced subsequent to the attack, the output level does not decline immediately because a corresponding central region of the S-shaped response has a high gain. Thus, overtones of a musical tone signal which eminently represent the power of expression and features of a base or a bass drum used as a musical instrument are more positively pronounced upon attack, and then if the level of the original tone is reduced, the levels of the overtones which the musical tone signal originally contains are raised by the gain which is obtained in the central region of the S-shaped response to boost changes in the timbre of the [base] bass or the bass drum, combined with the production of overtones anew which is achieved by the non-linearity in the central region of the S-shaped response even though such non-linearity is not so remarkable as noted in the saturation region of the S-shaped response. Thus, the features of the S-shaped response are effective, not only upon the attack of the [base] bass or the bass drum, but over the entire musical tones, to extract and boost the abundant music-expressing elements of the [base] bass or the bass drum which are masked and embedded therein, namely, the sense of the bass drum driving the air with sound pressure, delicate expressions upon attack and the slight reverberation of bass tones of the [base] bass, thereby producing new overtones in a more exaggerated manner to yield a sense of impact and a dynamic sense. When the S-shaped response is chosen to avoid the point symmetry (or to produce asymmetry between the positive and the negative side) as shown in Fig. 6, odd-numbered overtones can be diminished while even-numbered overtones can be augmented to allow tones of a more abundance and a less impurity in the musical sense to be obtained.

a7

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Please replace paragraph 1 on page 23 with the following:

In the above description, the filter means 31 is used to pick out components corresponding to double overtone regions from a bass musical instrument. However, it is also possible to pick out principally only components corresponding to double overtones of a musical instrument such as a base, for example, for which the bass tones are to be boosted. When principally picking out only components corresponding to the double overtones of the [base] bass, the filter means 31 may comprise a bandpass filter shown in Fig. 13, which may be a narrow-bandpass filter having a cut-off frequency on the bass side and a cut-off frequency on the higher pitch side which coincide with each other. An example of the resulting amplitude-frequency response is shown in Fig. 16. In this Figure, the pass frequency is 200Hz, and a response is such that a peak is located at the location of 200Hz with an attenuation on both the bass side and the higher pitch side which is equal to 12dB/OCT.

A8